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New Method of Thermometry, by Means of Sound.

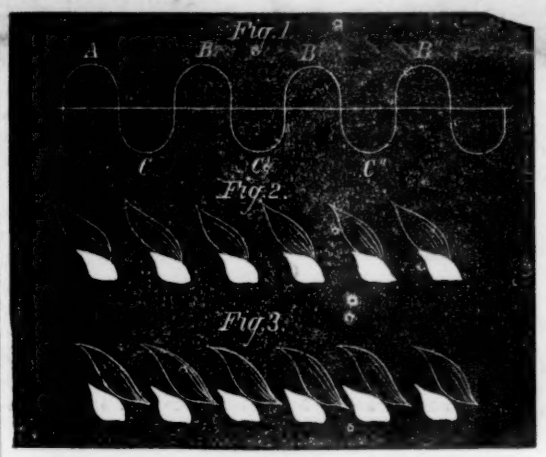
[For the cut which illustrates the following, we are indebted to Prof. Mayer himself. The context we owe to Prof. Youmans's Journal, the *Popular Science Monthly*. Professor Mayer has, however, been kind enough to revise the proof personally, and has made two or three important corrections.—Ed.]

Prof. Alfred M. Mayer, of the Stevens Institute, Hoboken, has made some rare and remarkable researches on sound, of which he lately gave an account before the Lyceum of Natural History, New York. The following is a summary of the views he presented:

That sound reaches the ear by a series of waves or undulations, is a generally-accepted fact. But, although so accepted, it may well be doubted whether many persons, even among those of considerable general culture, are possessed of a clear view of the nature of these waves. To obtain this, it is necessary to bear in mind that the waves of sound which take place within a gaseous medium are in no wise similar to those waves which undulate on the surface of water or other liquids. The latter form around their point of origin in concentric *circles;* the former are generated around that point in concentric *spheres;* all deviations from these forms being in both cases due to mere special disturbing influences. This conception having been fixed in the mind, it is readily seen that sound-waves consist of alternate swellings (involving a rarefaction) and contractions (involving a condensation) of the air, propagated from the point of origin, and that the thickness (length) of each wave is measured by the distance between the curved surfaces corresponding to the periods of maximum swelling (rarefaction) and contraction (condensation). Within the wave-limits, the progress of sound-motion is by no means uniform; and, could we accurately trace the steps in variation, we could hardly delineate the march of sound within the wave.

This result may be obtained approximately by attaching a small piece of copper foil to one of the prongs of a tuning-fork, and quickly drawing this (while vibrating) across a plate of smoked glass. A very beautiful representation of this march of sound may also be obtained by operating with an organ-pipe, having a hole at the middle (nodal-point), which is covered by a thin elastic membrane, offering no impediment to the transmission of the undulations. Directly over this membrane a little box or capsule is placed, through which a current of illuminating gas is conducted to a jet burning in front of a revolving mirror. The sound-waves being communicated to the gas, give rise to a series of flame-pulsations. When the mirror revolves, the quiet flame is reflected as a continuous, the pulsating flame as a serrated, band of light.

If, at this point of the experiment, the aid of one of Helmholz's resonance-spheres be called in—the resonance-waves being conducted by a pipe through a box and membrane (like those already described), to a second gas-jet placed exactly under the first—the image in the mirror will be duplicated. The resonance-spheres (resonators) here mentioned are thin, hollow, brass globes, with two openings opposite to each other; one being furnished with a neck for attaching a pipe, the other serving as a mouth for receiving sound-impulses. They act by sympathy, as it were, taking up and resounding with a special note, and that only, the special character of the note depending upon the relative capacity of the sphere, and the size of the mouth.



As the waves of sound, propagated through a uniform medium, travel with uniform velocity, it follows that, when the pulsations transmitted to the first jet from the organ-pipe, and the pulsations transmitted to the second jet from the resonance-sphere, pass through equal lengths of air, they will be reflected from the revolving-mirror as coincident serrations. When, however, the pulsations from the organ-pipe are transmitted through a depth of air equal to one wave-thickness or length, and the pulsations from the resonance-sphere are transmitted through a depth, either less or more (and not an exact multiple) than the wave-thickness or length, the two serrated bands of light, reflected from the revolving-mirror will not be coincident. If, starting with equal distances of the organ pipe and resonance-sphere from the jets, that of the latter be gradually increased, the serrations of the two images will be at first coincident, then non-coincident; then, when a distance of two wave-thicknesses is reached, again coincident, then again non-coincident; each coincidence corresponding to a distance equal to a simple multiple of the wave-length of the note. And if, on the other hand, the resonance-sphere be moved in such a manner that the coincidence of the serrations is not disturbed, it is evident that the motion must be in lines traced upon the curved surface of a body of air—exactly similar in size and form to one, two, three, etc., pulsations sent forth by the organ-pipe. Prof. Mayer was the first to trace the surface of sound-waves by this beautiful and ingenious method. It is highly probable that, by this arrangement, some hitherto unapproachable acoustic problems may meet with a solution.

The velocity of sound is not influenced by variations in the density of a uniform gaseous medium, provided the temperature of this medium remain stationary. But, when the temperature changes, the velocity is at once affected. Hence, a gradual rise in the temperature of the air, passing from the resonance-sphere to the gas jet, will be productive of a successive alteration of coincidences of serrated images, analogous to the alterations produced by increase of distance. This remarkable fact Prof. Mayer proposes to employ in measuring temperatures, and particularly the high temperatures of furnaces. This is to be accomplished by interposing a coil of porcelain or other fire-proof pipe between the resonance-sphere and the jet, and introducing the coil slowly into the furnace. By this method, Prof. Mayer expects to be able to measure temperatures with an accuracy equal to about ten degrees of the Centigrade thermometer, or even less.

Dr. Van der Weyde, on the Late Great Fires.

But the worst thing of all, which was also undoubtedly the cause of the greater fatality of the Chicago fire, was that the access from the street gas in the burning houses could not be shut off by want of proper stop-cocks in the street, and the obtuseness of the city authorities and of the managers of the gas works not to see that the gasometers were becoming exhausted, and that the gas was everywhere pouring with full streams through the broken pipes into the burning buildings. When all the damage was done, they at last shut the gas off from the whole city, when raminded of its danger by repeated explosions. Mr. Benjamin Noyes, late commissioner of insurance, has long ago repeatedly pointed out the necessity of proper cocks in the streets, so as to enable the firemen to shut off the gas from a burning building, and it is really astonishing to see so much lack of brains among the proper authorities, that they did not at once perceive the necessity of this precaution, but allowed gas to be introduced from the mains directly in the houses, with one single stop-cock in the cellar, which in many

cases of fire could not be reached, or perhaps even not found, in the confusion.

The flames being, in most all instances, assisted by this burning gas, equivalent to so much boiling gasoline, the heat produced was very violent, and the fire lasted so long that many of the so-called fire-proof safes were so thoroughly heated, if not destroyed, that only a charred mass was left of their contents, in books, notes, stock, greenbacks, etc.—*Manufacturer and Builder.*

Candles of Fossil Paraffine (Ozocerite).

We owe the following note, of articles in the Dublin Exhibition, to the *Chemical News:*

Messrs. J. C. and J. Field, London.—This celebrated firm exhibits many articles of interest, particularly in the candle line. They are also probably the exhibitors of the greatest novelty in this branch of manufacture, namely the ozokerite candles. This fossil resin was first mentioned by Meyer, who discovered it in Moldavia, in connection with coal and rock-salt. The source of the candles made by Messrs. Field is a product from the Carpathian Mountains, which seems to have been first submitted by Doctor Letheby to the notice of that firm in 1868. They seem to have surmounted all the practical difficulties incident to the purification of this unpromising brown substance, and have produced the most beautiful candles in appearance which have yet been made. The characteristics of the crude ozokerite which is shown is as follows:

Its color is brown, with a wax-like lustre when burning. Its odor is of the aromatic hydrocarbons. It is said to have a specific gravity of 0.94, and melts 66° C It distils without decomposition, and is not altered by strong acids. It slightly differs in chemical and physical properties, according to the source from whence it is derived, and the above description applies more to the specimens of crude ozokerite shown by Messrs. Field & Co., and examined by the writer. It is, when purified, a variety of paraffine having the following composition:

Carbon	85·75
Hydrogen	15·15
	100·9

Nothing can exceed the beauty of the candles as made by Messrs. Field & Co. from this unpromising looking substance: and it would appear from the report of Dr. Letheby, that they exceed any other yet introduced, as regards illuminating power. He gives the number ef grains required to give the light of 1000 grains of the best spermaceti candles as follows:

Ozokerite candles	754
Various paraffine candles	798 to 891
Sperm candles	1000
Wax candles	1150

As it has a very high melting point it does not bend or soften; it is, in fact, a much harder material than ordinary paraffine. It would be out of place to deal with Messrs. Field's numerous specialties in a periodical like the CHEMICAL NEWS; they are ingenious, and make up one of the most interesting cases in the exhibition. For instance, the tinting of paraffine candles mauve and magenta with aniline colors is a great improvement upon the old opaque mineral colors. As regards paraffine candles, this firm claims priority over all others in the introduction of them to the public. They say, "We claim the merit of being the first in the English trade to manufacture for general sale, paraffine candles, and to have mainly contributed to their success, etc." Messrs. Wm. Brown & Co., of Glasgow, were actually the first makers in 1855, but to show the great stride that this article of industry has made, we may mention that in the letter addressed by Messrs. Field to the Secretary of the Exhibition of 1862, they state that whilst the candle was introduced at a price of 2s. 4d., and with a consumption of three to four cwts. weekly, it was at this time sold for 1s. 5d. This firm use three to four tons weekly; and in 1867 the total English make was some 2000 tons annually.

Chemical Repertory.

No. 83.—January 2, 1873.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

588. SKELTON'S "CATOPTRIC" LANTERNS.—These, or something of the like, have apparently already been introduced into use in this country, though the samples we have had a chance to observe cursorily, as on Fifth avenue, by no means appear to bear out the eulogiums that have been shed upon the plan. The London *Journal of Gas-Lighting* has an item on them that we copy:

When these lamps were first introduced on Waterloo Bridge, we called attention to their superiority over the lamps in ordinary use for street-lighting, and now that the authorities of the city of London have resolved upon a trial of their merits, we may again refer to the subject. The principle of the invention is the application of reflectors, by means of which the rays of light, that in common street-lamps are wasted, become utilized, and are distributed into the dark intervals between the lamps, and this too, without the dazzling effects produced by ordinary reflectors. The reflectors employed by the inventor are strips of silvered glass enclosed in a frame and glass case, so as to preserve them from dust and breakage. These strips are arranged to occupy the upper half of each side of the lamp and the whole of the sloping roof, as shown in the drawing, or they may be fitted in the roof only, and they are so placed as to reflect the light to any level, or to concentrate all the reflected rays on the ground, within a short distance of the lamp. In Moorgate Street, these lamps have been placed on one side of the way, so that a comparison between them and the old lamps may be readily instituted.

589. THAWING THE TRACKS.—A newspaper item is as follows:

"One of the most useful inventions we have heard of for some time is credited to a citizen of Bedford County, Virginia, who, it appears, has just perfected an apparatus to melt snow and ice on railroad tracks, by means of a flame 'sufficiently intense to produce the effect instantaneously.' According to the plan of the inventor, the flame has to be shot from the fore part of the engine, and is relied upon to do its work without causing the slightest impediment to the progress of the train. All those who travel on railroads, either for long or short distances, during the winter months, having a lively recollection of the sufferings they have endured from the blocking of tracks with ice and snow, can readily appreciate the importance of such an invention. We are not aware to what an extent experiments have been made with it; but, considering the dangers of travel at this season, from causes of the nature alluded to, the result cannot be too soon made public.

590. POISONOUS PATENTS.—We recently put on record a poisonous water-pipe, in use in Sacramento City, California. The *Scientific American* tells us that Tripler's patented process for preventing rot in wooden pavements consists in saturating the wooden blocks with chloride of arsenic, or arsenic and chloride of sodium. The bottom planking and the sand between the blocks are also to be saturated with the same material, which is antiseptic and preserves the pavement from decay. It seems to us that the remedy is worse than the disease. Think of arsenic dust as an addition to the ordinary pavement dirt wherewith to fill the mouths of citizens!

591. PAVEMENTS AGAIN.—Much of the Belgian pavement of Broadway is worn so smooth that the slipping down of horses on it is nearly as common as it used to be on the discarded Russ pavement. Somebody suggests that bricks of india-rubber might be a good material with which to pave Broadway. Another proposes that horses should be shod with india-rubber; but to this Lord Dundreary objects, on the score that "a kick from a horse shod with india-rubber, you know, would be apt to rub a fellah out."—*World.*

592. DETERMINING AMMONIA IN GAS.—Dr. Vogel determines the ammonia by passing gas slowly through aluminum sulphate, whereby an ammonia-alum is formed. He suggests that alum be made in this way for commerce. For determining the quantity of ammonia in tobacco smoke, he passes it through an alcoholic solution of tartaric acid, when the acid tartrate of ammonia is formed.—*Am. Chem.*

593. DEODORIZED BISULPHIDE OF CARBON.—Years since, we have given our readers the methods of depriving this compound of its usual surpassing stench. A recent Cincinnati correspondent of the *Scientific American* objects to this property of deodorizability on the part of the bisulphide:

"I notice in your issue of October 19, a method for removing the disagreeable odor of bisulphide of carbon. Now if you can devise a way of removing the disagreeable taste from prussic acid, there will be another point made. What on earth people want to smell bisulphide of carbon for, I cannot understand. The more disagreeably it smells the better, for thereby some warning is given of its presence. It is a deadly poison. Its vapor when inhaled converts the iron of the blood into sulphide of iron, causing death. It is a very volatile liquid, and its manufacture is tolerably dangerous from the above mentioned reasons. I presume a vessel of it placed in a close room would cause death about as rapidly as carbonic acid or charcoal fumes. A cup full of the bisulphide placed in a tight apartment filled with grain will in a few hours kill not only every weevil but also its larvæ and eggs. It is a very useful substance, but at the same time under certain conditions, an extremely dangerous one.

ANDREW VAN BIBBER."

[We really do not see how Mr. Van Bibber is going to help himself, or to help us, in this case. Remonstrating with Nature has not hitherto been successful. She is relentless in carrying out her ideas. It has been asserted that the *pure* deodorized bisulphide of carbon may be inhaled with impunity, but until this is settled we should protest against its use in perfumery.—H. W.]

594. "BURNT IRON."—Of late years there has been much controversy regarding the nature of the change that constitutes so-called *burnt iron.* An English chemist has published investigations that appear to have shown it to consist simply in the diffusion of oxide throughout the substance of the metal. The eminent French metallurgic chemist, Caron, has however recently informed the French Academy that he has succeeded in putting iron into the condition called "burnt," by heating it in the open fire, in nitrogen gas, and in hydrogen gas; whence he concludes that this condition is not due to the absorption of any special gas, but to a modification in its molecular condition, caused by the heat. Caron also tested samples of iron at temperatures from 0° to 18° C., and concludes that iron does not become brittle by cold. He says:

"Whenever, by a strain, a bar of iron breaks with a crystalline fracture, it is certain that this structure pre-existed; it may have originated in poor workmanship, but is not due either to the long use, nor to the cold which it has undergone."

595. NEW HYDROCARBON ISOMERIC WITH ANTHRACENE.—C. Graebe.—When crude anthracene is treated with benzole or sulphide of carbon, the filtrate of these solutions contains several hydrocarbons, only one of which, viz., acenaphthene, has been isolated and studied. It appears that Dr. Glaser, while working with crude anthracene on the large scale, has found a new hydrocarbon, which he has sent to the author for further investigation. The new compound, $C_{28}H_{10}$, is in many resdects akin to anthracene; it crystallizes, exhibits fluorescence, fuses at 105°, boils at 340°, is hardly soluble in cold, more readily so in hot, alcohol, and is very soluble in benzole, ether, and sulphide of

carbon; vapor density, 6·28 (theoretically 6.16); it combines with picric acid, and behaves like anthracene with chromic acid.—*Berlin Chem. Soc.*

596. The New-Mexican Anthracite (?)—At the last meeting of the *Mining Engineers Institute*, Prof. Cox said he believed he had had the pleasure of being the first to visit the anthracite mines of New Mexico:

"In my report on the subject, I described the coal as hard and brilliant. But it contains a large amount of water, the volatile matter being nearly all water, though in appearance the coal is like the best Pennsylvania anthracite. When we have thoroughly studied these Rocky Mountain coals, we may change some of our notions concerning their classification. I analyzed this anthracite; and so far as I now remember (it was many years ago) there was not more than 12 per cent. of volatile matter in it. Probably it contains some phosphorus. It is well known that all coal is of vegetable origin, and all vegetables contain a small proportion of phosphorus. This anthracite is about 27 miles from Santa Fe, and very near to rich mines of lead ore, which could, and will some day, be smelted with it."

597. "Fire Annihilators."—A writer in the *World*, who signs himself J. C. O., is apparently not so much impressed as some of our scientific writers have been of late, with the availability of carbonic acid gas for putting out a house-a-fire. He says that the plan "failed to answer the purpose when applied to the building where it was first tested.

"It was in the latter part of the last century that Pinelli, of Naples, noticed the effects of the gases arising from the Grotto del Cane, near Lake Agnone, three or four miles distant from Naples. The gases extinguished light, as has been often observed by tourists, who are invariably led to the grotto that they might witness it, and as also its effects on animal life. A dog is cast in, who immediately has convulsions, and would die if continued there a couple of minutes. Pinelli applied the gas by means of pipes as a fire extinguisher, and invited the public to witness the immediate suppresion of the flames of the building he was to set fire to. To prove his faith in his discovery he fired the house and remained therein. When the flames had spread through the building he applied the gas, and behold the fire was extinguished, but Pinelli's light of life had also gone out.

"No building, particularly warehouses, should be left without its protection, and therefore the gas extinguisher will not do. We cannot afford to lose life to extinguish fire, nor would we find watchmen willing to remain in buildings provided with the gas extinguisher."

598. Strength of Sewage.—A writer in *Engineering* states that in any town, free from the abnormal circumstances of manufactures, the sewage, *apart from rainfall*, presents constant features. That of Sunday is invariably the weakest in all respects. Towards mid-day on Monday it increases in strength, so far as matters in solution are concerned; arriving at a maximum at about 11 to 1 o'clock on the Tuesday of each week. It thus remains pretty constant until six o'clock on Saturday evening, when its strength began to abate, over Sunday, as above mentioned.

"Washing days" are especially notable. Tuesdays and Wednesdays present a large amount of fatty matter, causing soapy bubbles on the sewage, and the presence of much alkali (soda chiefly) This fact, which is indubitable, presents great difficulties to all the chemical methods that have been proposed to utilize sewage, as all the chemical conditions are affected.

599. American Iron Purification.—In the *American Chemist* we find the following highly important information:

"The St. John and Cartwright process for purifying gas consists in passing the gas through a mixture of the native hydrated oxide of iron, iron borings and charcoal, in place of the slaked lime. The cost of this material for purifying 600,000,000 feet of gas is $6,000, whereas the lime for the same quantity would cost $18,000. Moreover the labor saved by the iron process is fully 25 per cent. The process is already in use in several works, purifying an aggregate of 1,100,000,000 feet of gas per year.

600. Dreadful Imaginings?—The cometary scare of last year, the initiation of which was so absurdly and unjustly attributed to Plantamour, was "not a circumstance" to a new source of fanciful terror very plausibly urged by Dr. H. Draper in a recent lecture. According to this, a flame may come from the sun which would be competent to lick up and vaporize this little telluric sphere of ours as it were a snow flake. He says:

"If it be true, and there seems to be no doubt of the fact, that these streams of intensely heated hydrogen can be ejected from the body of the sun with a velocity which, if it endured, would bring that breath of fire to our earth in a few hours, what would be the effect of an eruption on a larger scale? What would happen to men and animals if an explosion as general as that in Tau Coronæ Borealis took place in our sun? In May, 1866, that star, which is usually invisible to the naked eye, suddenly flamed up till it was as bright as a star of the first magnitude. When examined by Miller and Huggins it was found to be enveloped by a prodigious atmosphere of hydrogen hotter than its own photosphere. In a few days it dwindled away and sank to its former insignificance. But what must have been the fate of animated beings on the surrounding planets, if any such there were? They were undoubtedly consumed at once and utterly dissipated. Who shall say that our sun, which is also a star, will not do the same to-morrow, or the next day?"

To any one who may feel inclined to convert himself into a lunatic in view of all this, we would say:

Soyez tranquille—the calculus of chances would show that there is about as much probability of this occurring as there is of the swallowing up of one of our continents by an earthquake, or the conversion of the deep Atlantic into a chain of Andean mountains, things which doubtless *might happen* also.

601. Cold from Gaseous Dilatation.—The *Scientific American* says that air was compressed by Professor Tyndall, by means of a column of water 260 feet high, to one-eighth of its original volume (120 lbs. to the square inch) and then allowed to escape. As it rushed out, it expanded so violently and caused such an intense cold that the moisture in the room was congealed in a shower of snow, while the pipe from which the air issued became bearded with icicles.

Water Supply and Universal Power.

In writing upon the subject of a "Universal Power," two months ago, we little thought that the plan proposed would soon approach a practical realization. But already prominent engineers—one of whom is Mr. Craven, late Engineer of the Croton Water Works—are studying the details of a plan which is to fulfill part of the conditions we laid down. The incentive to the work is the Boston fire, and the discovery that to the danger which New York lies under from the inflammable nature of its buildings, is added another which greatly magnifies the risk from that cause. The trials with the self-propelling fire-engine, of which we spoke last week, proved that there was a very serious lack of water in the lower part of the city. As we said then, the pressure at the hydrant on the corner of Broadway and Cedar street was only seven pounds, not enough to fill the pump as fast as it discharged its water. The flow of water in the main was so sluggish that it was evident the supply would fail under the demands of a great fire. In some correspondence on this subject, which has passed between General Shaler and Mr. Craven, the former estimates that a fire which would require eight streams to subdue it—that is to say, less than the number of streams often needed to quench city fires—would call for the discharge of 2,400 gallons of water per minute, or 1,440,000 gallons per hour, a quantity greatly beyond the capacity of the Croton supply pipes in some parts of the city. There are, therefore portions of the city where no fire department, however well organized, could be depended upon to overcome a large fire. This is a radical defect in the present system which must be remedied. The remedy proposed is to use the water of the rivers around New York, and to establish powerful engines for raising it, together with a system of special mains throughout the city. It cannot be doubted that such an arrangement would benefit in a marked degree the Croton water supply, or that its cost would be entirely within the city's means, and would be an economical investment.

Mr. Craven says that the present system of water-pipes in this city is incapable of furnishing great supplies for the immediate extinguishment of fires; that the utilization of the ocean water surrounding us is both desirable and feasible; that the reduction in the cost of maintaining the Fire Department would be nearly equal to the interest on the amount required to construct pumping works. This expense could be still further reduced by selling power to the innumerable warehouses and stores, and manufactories in the city; and we hope that the plans which are to be drawn up will include estimates for plant large enough to supply the demand from these establishments. The substitution of water for the numerous steam powers in use would itself be one of the best preventives of fire. It is well known that the Boston fire is supposed to have originated in the engine room of a warehouse. The number of similar engines in New York mercantile buildings has been estimated at 1,000, and certainly a thousand horse-power daily is a small estimate for the amount of power which could be sold almost at the start. There is not the least doubt that if this plan of a special system of sea water supply is established, the universal method of power supply will grow out of it. If we could calculate the saving in pay of engineers, consumption of coal, rent of space, cost of boilers and insurance, and the numerous other economies which would result from the use of water in place of steam, the total would undoubtedly form a very handsome interest upon the cost of the works. It is true that the whole of this saving could not be gathered in to the benefit of the new system, but a large part of it could be collected.

Five millions of dollars has been mentioned as the probable cost of establishing the new works, and this sum would, at all events, cover the cost of works for supplying the lower part of the city with water, supposing the new system to be confined to that quarter which is in greatest danger from the present lack of pressure. It is just in this district that small motors are most in demand. The sale of power to 500 buildings at an average of $1,000 each, would pay the interest on that sum, and perhaps the cost of maintenance. That $1,000 is a moderate estimate, may be seen from the fact that the pay of an engineer alone will amount to that, and water machinery would need no special workman.

We spoke in our former article of the disadvantages which must necessarily arise from the use of sea water in extinguishing fires; but the use of a special water system for the Fire Department is not necessarily connected with the use of sea water. The former is unquestionably good, and the only point to be discussed is the one of cost; the latter may be inapplicable on account of drawbacks inherent to its use. Nor is this subject in any way connected with the Holly system of water works. That, too, is distinct. It may be wise or it may be unwise; but the arguments for or against it in no way affect the problem of giving the Fire Department an independent supply of water, which may be done on the Holly system, or on any other.

Just as New York is discussing the question of establishing pumping works, Chicago completes her largest engine. It is capable of raising 36,000,000

gallons of water 150 feet high in twenty-four hours, and is itself of about 1,200 horse-power. The introduction of a new 36-inch main has increased the head of water in some parts of Chicago as much as 20 feet. From this we may see what effect the now pipes which have already been laid in New York may have. The water supply of the city has, in fact, received several important improvements within a few years, and if to these is added a separate fire system, the citizens of America's greatest city may look forward to comforts in the use of water from which they have long been debarred.—*Eng. and Min. Journal.*

The Gas-Stoker's Strike in London.

We had hoped that the important concessions made by the directors of the Imperial Company a few weeks ago would allay the feeling of discontent and disaffection which had been exhibited by the men engaged at their works. The directors had practically conceded the whole demands of the stokers with regard to Sunday labor, having agreed to diminish it to a minimum, and to pay 50 per cent. additional wages in every case where its continuance was imperative We regret to learn that the men have not met their employers in a corresponding spirit of conciliation. It seems that for some time past there has been a large amount of insubordination in the retort-houses, and that strong men habitually shirked their work. A culmination was reached on Friday last at the Fulham station, where a coke-backer was discharged for a manifest breach of duty. This occurred shortly before noon, when the stokers employed on the short day shift, lasting from 12 to 6 o'clock, were proceeding to take their turn. These men being informed of the circumstance, declined to go on duty until the discharged man was replaced, and his substitute, a non-unionist, was removed. They were informed by the deputy manager that in the absence of Mr. Kirkham, the engineer, compliance with their request was impossible, and they were advised to go to their work until his return. When Mr. Kirkham was apprised of what had taken place, he very properly refused to reinstate the man who had been discharged. The consequence was that the whole of the night-shift men refused to go on their turn, and left the works. The company have not been unobservant of the fire which has been smouldering for some weeks past, and anticipating that at any moment it might burst forth in a flame, had made provision to meet the emergency. Men were immediately summoned from all parts of the metropolis, and a very hearty response was given to the call. The only difficulty appeared to be how to dispose of the whole of the force which soon assembled. By a wise forethought, a very ample commissariat was provided, and the men, all inexperienced as many of them were, went to work with a will, so that there was no pause in the manufacture of gas at that station. On Saturday morning the day men refused to put in an appearance, and a repetition of the previous night's arrangements had to be carried out. At the other stations of the company order had prevailed, and this happy state of things continued until Saturday evening, an hour after the men at the St. Pancras station had been at work. It appears that about that time a delegation from the men on strike at Fulham reached St. Pancras, and, having gained access to the works, persuaded the whole of the stokers to leave, so that in the course of a quarter of an hour there was not one on the premises. Owing, however, to the arrangements already referred to, their places were soon supplied; indeed, so great was the glut of men, that the manager was able to make a selection, and to decline the services of upwards of 100, who, though willing to be employed, seemed to be disqualified for the duty.

It need hardly be said that great and almost insurmountable difficulties had to be met in the orderly conduct of the works so abruptly served by new hands, and under the trying exigencies of the time the public will need but little apology, if a deficiency of pressure or illuminating power arose from these "unavoidable circumstances." When Sunday morning came, the day hands presented themselves, and as they had taken no part in the rebellion of the previous night, they were allowed to go on duty as usual. The spirit of disaffection had in the meantime spread to the Haggerstone station, where the men struck and are still holding out. The company seem to feel no apprehension as to the final result of this movement on the part of the men, and to have unlimited resources at their command for tiding over the temporary disruption in their establishment.

It is to be hoped that the men for their own sakes, will listen to wiser counsels than at present are allowed to sway them, and will not permit themselves to be the prey of professional agitators. The company have dealt liberally with them, and are prepared to listen to any representations of unredressed grievances, if such there be. But, it is impossible that they can allow a state of things in which all rule is set aside, and they, with all their public obligations upon them, are subjected to such high-handed dictation that they cannot discharge a lazy or incompetent man at discretion. It seems that about the middle of last month the directors of this company increased the wages of their employees nearly 20 per cent. For 12 hours' work, either by day or by night, except on Sundays, between 6 a. m. and 6 p. m., scoopmen's wages were increased from 3s. to 5s. 11d.; stokers to 5s. 6½d.; coke-hole men to 4s. 7d., and coal-stagers to 4s. 4d., while the gangs employed on Sundays between 6 a. m. and 6 p. m. received a day and a half's pay for the 12 hours at the above scale. The men expressed themselves satisfied with this, and hence the more surprise on the part of the directors at the step which has been taken.

A letter from the secretary of the Independent Company informs us that yesterday morning at six o'clock the stokers employed at the works of that company struck work without previous notice, the only reason assigned being that they had orders to do so by the delegates of the Stokers Union. A few weeks since the wages of these men were increased to the extent of about 15 per cent., and with this increase they expressed themselves perfectly satisfied. Of course, this occurrence has placed the officials of the company in a very difficult position, but they are making the most strenuous exertions to maintain a supply of gas. Under the circumstances, the company rely upon the sympathy and co-operation of the public in meeting a strike so utterly without cause.

The strike has also extended to the Beckton, Bow Common, Horseferry Road, Pimlico, and Kensal Green works of The Gas-Light and Coke Company, to the Greenwich works of the Phœnix Company, and to the Surrey Consumers Company's works at Rotherhithe. Up to the time of going to press most of the men at the Blackfriars station of The Gaslight and Coke Company, the Bankside and Vauxhall stations of the Phœnix Company, and at the Nine Elms Station of the London Company have continued loyal to their employers.—*London Gas-Light Journal, December 3.*

The Continental Iron Works.

The Continental Iron Works, Greenpoint, L. I., T. F. Rowland, proprietor, are now making extensive additions and alterations. A new building, two stories high, has been erected, of which the dimensions are 160 by 50 feet, and an addition has beeen made to the foundry, 100 by 75 feet. These works employ 600 men, in the erection of gas works, building of iron vessels, and the manufacture of specialties, such as steam yachts, etc.

Mr. T. F. Rowland is one of our ablest engineers, having had an extended experience of from twenty-five to thirty years, during which time he has built some of the largest engineering works in the country. He is now furnishing the Nassau Gas Works, Brooklyn, E. D. (which we shall illustrate in a succeeding number of the MANUFACTURER AND BUILDER), and the Union Works, N. Y. City, complete. The above works are very large. He is also furnishing holders and other work for the gas works of Dorchester, Lawrence, New Bedford, Water Power Company, Holyoke and Springfield, Mass., Lonsdale Manufacturing Company, R. I., Waterbury, Conn., Nashua, N. H.; Detroit, Mich.; Perth Amboy, Passaic and Princeton, N. J.; Albany, Troy, and East New York, New York State; also furnishing the architectural iron-work for the new Boston Post Office. The work for the above gas companies is all executed with neatness and dispatch, and, and with such facilities as an establishment of such magnitude only can perform. The advantages for producing iron-work for fire-proof buildings, architectural as well as substantial, are not excelled by any concern in the country.

Mr. Rowland, aided by his able corps of assistants; can offer inducements to those wanting any portion of gas works, or any designs of architectural iron work, which cannot be excelled.

We take pleasure in recommending the Continental Iron Works to our readers, the public, and more especially to all needing such articles as it makes a specialty to manufacture.

[The above which we take from our esteemed contemporary, the *Manufacturer and Builder*, is fully in accordance with our own views and information, and we cordially endorse every word.—ED.]

Researches on Gas Liquors, and the Presence of Chlorine Compounds in Coal.

By DR. G. TH. GERLACH.

[ABSTRACT.]

The author of this paper was led to make the investigations detailed from having observed that the estimations of ammonia, when made by simply saturating the liquor with standard sulphuric acid, were always lower than when the ammonia was distilled over after the addition of caustic soda or lime to the liquor. The researches go to prove that the value of a liquor may be greatly under-estimated when the test of simple saturation is relied upon. It is shown that, besides the carbonates of ammonia and sulphide of ammonium, there is present in gas liquor a small amount of hyposulphite of ammonia, a larger proportion of sulphate, and in some cases—but not when English coal is used—a large proportion of chloride of ammonium. In the liquor produced at the gas-works in Chemnitz, where Zwickau coal is employed, chloride of ammonium is the chief ingredient, as is shown in the following analysis:

In 100 Cubic Centimetres of Liquor.

Hyposulphite of ammonia,	0·1036	grammes.
Sulphide of ammonium. ...	0·0340	"
Bicarbonate of ammonia,...	0·1050	"
Carbonate.....	0·4560	"
Sulphate.....	0·0462	"
Chloride of ammonium.....	3·0495	"

The author has analyzed the gas liquors from several other German towns, but in no case has found so large a quantity of sal ammoniac, although some of that salt is invariably present. The following is the process adopted by Dr. Gerlach for determining the amount of chlorine in liquor. Two grammes of carbonate of soda (free from chlorine) are added to 10 cubic centimeters of the liquor, and the mixture is evaporated to dryness on a water-bath. The dried mass is then mixed with 5 grammes of nitrate of potash (free, of course, from any chloride), and the mixture is placed in a platinum crucible, and fused until all organic matter is destroyed and a colorless mass remains. When cold this mass is dissolved in water, the alkaline solution is neutralized with nitric acid, and then the chlorine may be precipitated by nitrate of silver, or the amount determined by means of a standard solution of the nitrate.

The author remarks that the presence of chlorine compounds in coal has never been observed, no mention of any being made in any analyses of the ashes of coal he has been able to consult. The reason he says is that in the incineration of coal the chlorine is vola-

tilized in the form of chloride of ammonium. Most probably the chlorine was originally in combination with sodium as common salt, from which compound it is dislodged by the action of silica always present in coal ashes.

The sulphate of ammonia is accounted for on the supposition that the sulphate of lime always present in coal gives off its sulphuric acid under the influence of superheated steam; on the other hand it is probable that free sulphuric acid, for the most part, is, in the presence of red-hot coke, reduced to sulphurous. Hyposulphite of ammonia is produced by the reciprocal action of sulphide of ammonium and sulphite of ammonia.—*London Journal of Gas-Lighting.*

The New Croton Reservoir.

About the middle of November last, Commissioner Van Nort, accompanied by Engineer Tracy, inspected the new Croton Reservoir, at Boyd's Corners, and found the work in such an advanced state toward completion as to justify the belief that the water (3,000,000,000 of gallons) can be admitted during the present Winter. The reservoir is constructed in a gorge running between two mountains, which form the northern and southern walls, the eastern end being formed by a wall of stone and concrete, 90 feet high, (30 feet being below the land line, and on a solid rock foundation,) and a quarter of a mile long, with a thickness of 60 feet at the base and 30 feet at the top. Inside this wall is a slanting wall of earth, surmounted by stone, 210 feet thick at the base and sloping off until it reaches the stone wall about thirty feet from the top. Beneath this stone and earthen wall are laid pipes four feet in diameter for the outlet of the water, a dry well with flood-gates being inside the wall, with an entrance far above the water-line; a second circular well with another flood-gate, being in the wall proper, and a third, similarly supplied, being outside the wall. All this is completed with the exception of placing and fixing the gates. The reservoir will cover a space two miles in length by a quarter of a mile in breadth, and will store a great quantity of water which now runs to waste over the dam, the present overflow being thirteen inches in volume. In order to keep the water pure a portion of the rock of the northern mountain has been cut away to form an aqueduct for the overflow, which will empty itself into one of the tributaries of the Croton River, and so work its way into the present water course. As the original river had its bed through the gorge formed by these two mountains, the reservoir cannot well avoid being filled from the water-course: and, when once filled will always be kept so except in times of great drouth, when the water thus stored can form a supply for the use of the City in the event of the ordinary sources of the Croton River becoming dry, every rainy season replacing the water thus drawn off.

Self-Styled "Practical Men."

Remarks by Mr. Bramwell, Chairman of one of the sections of the British Association, last summer:

There is a perpetual bugbear in the way of improvement, and that bugbear is the so-called "practical man." Mr. Bramwell had been brought up as an apprentice in a workshop, and had practised his profession all his life. The truly practical man of all others he admired, by whom he wished persons to be guided, because the truly practical man is one who knows the reason of that which he practices, who can give an account of the faith that is in him, and who, while he possesses the readiness of mind and the dexterity of action, which arises from long continued and daily intercourse with the subject of his profession, possesses also that necessary amount of theoretical and scientific knowledge which justifies him in pursuing any process he adopts, which in many cases enables him to devise new processes, or which, at all events, if he be not of an inventive quality of mind, will enable him to appreciate and value the new processes devised by others. This is the truly practical man. But the practical man as commonly understood means the man who knows the practice of his trade, and knows nothing else concerning it; the man whose wisdom consists in standing by and seeing, but not investigating the new discoveries which are being made around him; in decrying those discoveries; in applying to those who invent improvements, even the very greatest, the epithet of schemers, and then when he finds that, beyond dispute, some new matter is good and has come into general practice, takes to it grumblingly.

The aim and object of such a man, indeed, is to insure that he should never make a mistake by embarking his capital or his time in that which has not been proved by men of large heart and large intelligence. It is such a man as this who delays all improvements as illustrated by the experience of Bessemer, Siemens, Galton, and many others. This conduct of the so-called practical man arises not only from ignorance of the principles of his profession, but from another one, and that is, you offend his pride when you come to him and say, "adopt such a plan; it is an improvement." His instinct revolts at the notion that you, a stranger, very likely his junior, and very probably, if the improvement be an original and radical one, a person not even connected with the trade to which that improvement relates, should dare to assert that you can inform him of something connected with his business that he did not know. In too many instances the owner has intrusted the management to a foreman or manager, who was often one of the so-called, as distinguished from the real "practical men." He pointed out how such persons scoffed at and obstructed inventors, and derided them as schemers; pointed to Mr. Bessemer as a victim. In conclusion, Mr. Bramwell advocated the formation of a society to give prizes for the most economical form of engine construction and maintenance.—*Proceedings of British Association.*

Coal in Belgium.

The Belgians are very painstaking statisticians, although rather sluggish ones, and the world has just been favored with an elaborate table, which is, in fact, a history of the Belgian coal fields for the last 35 years. The production and consumption would appear to have been as follows year by year:

Year.	Production.	Consumption.
1836	Tons 3,056,464	2,282,252
1837	3,228,807	2,439,724
1838	3,260,271	2,484,756
1839	3,479,161	2,733,392
1840	3,929,963	3,150,490
1841	4,027,767	3,012,573
1842	4,141,473	3,126,747
1843	3,982,274	2,895,953
1844	4,505,240	3,261,641
1845	4,919,156	3,375,384
1846	5,037,402	3,681,569
1847	5,664,450	3,937,462
1848	4,862,694	3,402,124
1849	5,251,843	3,586,935
1850	5,020,288	3,838,404
1851	6,233,517	4,176,477
1852	6,795,254	4,691,708
1853	8,172,687	4,841,092
1854	7,947,749	5,321,784
1855	8,409,330	5,434,981
1856	8,212,416	5,346,292
1857	8,383,902	5,496,890
1858	8,925,714	5,834,398
1859	9,160,702	6,015,467
1860	9,610,895	6,160,589
1861	10,057,163	6,678,112
1862	9,936,625	7,043,645
1863	10,345,330	7,454,356
1864	11,158,336	7,834,742
1865	11.840,603	8,272,916
1866	12,774,662	8,802,899
1867	12,755,882	8,674,676
1868	12,298,589	8,003,969
1869	12,943,994	8,675.175
1870	13,697,110	9,944,781
1871	13,733,176	10,546,972

It will thus be seen that the great bulk of the coal extracted from the soil of Belgium is consumed in Belgium itself. The progress of consumption has been especially rapid. From 1836 to 1840 there was a marked advance year by year. In the next two or three years there was little or no progress, but in 1844 the consumption resumed its apparently normal course of development, and matters moved on very encouragingly until 1857; then there was another check, but the figures soon began to move upwards again, and no further interruption was experienced in the expansion of the yearly totals until 1856. In 1857 the consumption once more began to advance again with rapid strides, and progress, progress, nothing but progress was observed until 1866. The next two years, 1867 and 1868, presented a period of retrogression, but in 1869 the ground lost was fully recovered; and during 1870 and 1871 an extraordinarily rapid advance was achieved. Nevertheless, the exportation of Belgian coal has also displayed a steady tendency to advance, the exports year by year since 1836 having been as follows:

Year.	Tons.	Year.	Tons.
1836	773,612	1854	2,625,958
1837	789,083	1855	2,974,349
1838	775,534	1856	2,866,137
1839	745,769	1857	2,887,012
1840	779,473	1858	3,091,316
1841	1,015,191	1859	3.145,235
1842	1,014,716	1860	3,450,306
1843	1,086,321	1861	3,379,051
1844	1,243,399	1862	2,891,980
1845	1,643,472	1863	2,890,864
1846	1,355,833	1864	2,322,594
1847	1,826,988	1865	3,568,687
1848	1,460,570	1866	3,977,772
1849	1,664,908	1867	4,081,206
1850	1,987,184	1868	4,294,610
1851	2,057,050	1869	4,268,819
1852	2,103,546	1870	3,752,329
1853	2,331,585	1871	3,186,204

The exports will seem to have attained their maximum in 1868, while since 1869 they have been somewhat declining. It is not very difficult to divine the cause of the declension. The outbreak of the Franco-German war, in July, 1870, paralyzed the French demand for Belgian coal, and the Communist troubles of March, April, and May, 1871, helped to still further derange the course of business. Since June, 1871, the consumption of Belgian coal in France has regained, however, something of its former extent and importance, and there is little reason to doubt that Belgium will export a large quantity of coal to France for many years to come. The average production of coal annually for each working miner in Belgium was 100 tons in 1840; in 1870 it had grown to 148 tons, so that the Belgians have gradually acquired increased proficiency in coal mining.—*London Mining Journal.*

New Fire Proof Construction.

The *Building News* publishes the following description of an invention in which iron or steel, hollow earthenware and concrete or cement are the materials employed in combination. The walls, partitions, floors and roofs are constructed of cells of metal in which are placed earthenware pipes, the sides of which are splayed outward at the base to form a skewback. The pipes and iron flitches are bolted together so as to constitute composite girders. Between each skewback, an earthenware hollow pipe with oval shaped head and flat soffit, channelled and indented to receive the plaster of ceiling, is placed with sufficient room left between the composite girders to receive a charge of cement concrete. The upper surface of the floor is leveled and covered with strong cement grout. Holes are left in the soffits of the hollow pipes for ventilation, and the pipes themselves may be utilized to convey warm air through the building. In walls and partitions, the iron and steel lengths are placed in a vertical, in floors, in a horizontal, and in roofs in an angular position.

In partitions, wire is used instead of lath to receive the concrete and plaster. The proportions of the concrete are six parts of broken brick, slag and sand, and one of cement, well mixed. The floors are made in one body and not in layers. This method is said to be cheap, to require no skilled labor to construct, to furnish thorough ventilation, and to require comparatively no repairs.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Carbolic Soap.

London, December 1st, 1872.

Mr. Editor: Your correspondent, Magnus Ohren's question as to "whether carbolic soap, so largely used, not only for households, but for the toilet, can be poisonous?" points to a very popular misapprehension as to the nature of carbolic acid

Carbolic poison is not a poison; although owing to its caustic nature if taken internally in an undiluted form it will produce all the effects of a strong caustic, yet if neutralized by an alkali, as soda, magnesia, lime, etc., may be taken internally without any ill results, but possesses most valuable antiseptic properties, and is very extensively used in medicine. Soda, in the form of caustic soda, will produce death if taken internally, but when neutralized in the form of carbonate of soda, it is quite harmless. Therefore carbolic acid should *never* be used in its raw state, except as a cauterizer, but the carbolates prepared from it may be used to any extent, without danger.

The "fluid carbolate" is a fine lotion for sores, wounds, etc., and useful in many internal complaints. The action of the carbolates in destroying insect life, although free from poison, is very interesting. They die instantly on coming into contact with a solution of any of them; but this rapid action is not that of poisoning, but arises from the fact that insects of the parasitical species are provided with albumen in lieu of blood, and breathe through the air pores or spiracles instead of their mouths, and as the carbolates have a powerful action in coagulating albumen, as soon as any of these insects get immersed in a carbolate solution, it enters the breathing pores and stops circulation by solidifying the albumen; so they do not die from poisoning, but literally from "shortness of breath." The action upon them is just similar to that of boiling, upon the white of an egg. The carbolate (or carbolic) scouring soap provides a safe and efficient means of exterminating all house pests of the insect tribe, and parasites upon animals, as it is perfectly harmless; thousands of sheep being annually dipped in a carbolic dressing. This distinction between carbolic acid and the carbolates cannot be too strongly marked.

The carbolic soap for toilet purposes is recommended by the leading authorities in cases of skin diseases (including Professor Erasmus Wilson), and is extensively used.

The combination of carbolic and sulphurous acids in the form of a sulphate of magnesia and carbolate of lime (McDougall's patent preparations) was declared by the Royal Commission on cattle plague in England, to be the most efficient disinfectant, and was freely sprinkled over the fodder and mangers of the cattle.

The carbolates in the form of powder, fluid, and soap, for medicinal, household, agricultural, and general sanitary purposes, are now very largely used in Great Britain, and are being introduced by our agent Mr. Millar, into the United States. His address is (P. O. Drawer 5,839) New York. We are, Sir,

Your obedient servants,

McDougall Bros.,

Patentees and Manufacturers of Carbolic Preparations for Great Britain and United States.

The McIlhenny Method—Important Figures.

Portland, Me., Nov. 26, 1872.

Prof. Henry Wurtz.

Dear Sir: In compliance with your request, I have made an examination of the accounts of this company, for the purpose of ascertaining the yield of gas per pound of coal, under the "McIlhenny Vacuum Process."

This process has been in constant use on all our benches since the spring of 1869. Our accounts are made up annually to July 1st, and I have therefore taken the three years ending July 1, 1872.

As you wished to have a statement of results, independent of the engineer's returns, I have simply taken the quantity of coal on hand July 1st, 1860, and July 1st, 1872, and the quantity purchased between those dates, and the number of feet of gas sold and used by the company for the same time. All of these data I have ascertained very nearly. Some small items I have obtained by estimate, but always on the safe side. The matter does not admit of a perfectly accurate estimate, as, for instance, I take the quantity of coal purchased, by the invoices. The meters are not all taken the same day; and there are other things depending somewhat on estimate, and where of course there is a liability to mistake, but not a mistake of any magnitude, or that could affect the results of 3 years operations beyond an inconsiderable fraction.

For the three years named, the whole quantity of coal carbonized is 11,932 tons, or 26,727,670 pounds, viz.

Common caking coals	11,054	tons
Scotch cannel coals	676	"
Albert coal	202	"
	11,932	"

The whole quantity of gas consumed, in the same time, for which the company have received payment is 123,650,000 feet; used by the company, 1,069,000 feet; making 124,719,000 feet, the whole quantity accounted for; being at the rate of 4.66 feet per pound of coal.

The quality of the gas has been uniformly good. It has been occasionally tested, and never, I believe, found below seventeen candles. The steamers from this port to Boston use our gas going, and Boston gas returning. The officers have repeatedly informed me that our gas is as good as the Boston, which is a high standard.

The quantity of gas made as registered by the station meter, of course considerably exceeds the figures I have given. I understood that you only want from me a statement of results as shown by the treasurer's accounts, viz., the quantity of coal carbonized within the three years, and the quantity of gas consumed and paid for; to which I have added the quantity used by the company. Very truly yours,

Edward H. Davis,

President Portland Gas-Light Company.

Letter from Mr. Greenough.

Boston Gas-Light Company,
December 17, 1872.

Professor Henry Wurtz.

Dear Sir: In the paragraph on the Boston fire in the Gas-Light Journal of 2nd inst, I find that my remark to you relative to the loss of 10 per cent. of the gas consumed on Saturday evening, was misunderstood. On that night we had on hand and made about three and a half million cubic feet of gas, all of which was burned. Of that amount I estimated about 10 per cent. had gone into the fire district. On Sunday the loss was very much larger. Yours truly,

W. W. Greenough.

Circular.

Office of "The American Chemist,"
Nos. 706 and 708 Sansom street, Phil'a,
December 1872.

Dear Sir: Having assumed the publication of "The American Chemist," I desire to call your attention to the advantages which it offers as an advertising medium.

Commencing with the January number, a largely increased edition will be printed, and active measures will be taken to extend the circulation. As no advance will be made for the present on the old prices, as stated below, the "Chemist" will be found one of the most desirable means of publicity existing for scientific schools and colleges, manufacturers of chemicals, publishers of scientific books, dealers in philosophical apparatus, etc., etc. Very respectfully,

Henry C. Lea.

Suggestions Wise and Otherwise, Upon the Subject of Fire Prevention.

Under the heading, "Suggestions and Opinions of Scientists," the New York *Herald* publishes, November 21, a communication from Benjamin Noyes, late Commissioner of Fire Insurance, in which he attributes the rapid and uncontrollable spread of the fires in Chicago and Boston, more especially in the latter conflagration, to the escape of gas from melted or broken gas-pipes; also, a communication from Mr. Joshua Kidd, in which he takes the ground that the products of combustion from the boilers of steam fire engines might be mingled with the exhaust steam, and advantageously applied to the extinguishment of fires; also communications from George M. Van Nort, Commissioner of Public Works, one from Edward H. Tracy, Chief Engineer, and one from John I. Serrell, Consulting Engineer, in which the three latter gentlemen express a most decided opinion, backed up by what seem to us the soundest reasons, against the proposed scheme of re-inforcing the water supply of New York city by water pumped and forced from the North River.

That gas may in some instances originate a fire by an explosion is undoubted; but that in any marked degree it contributes to the general spread of great fires is not at all consistent with the conditions of the case.

The common illuminating gas is not a supporter of combustion like oxygen, but simply fuel which develops in burning a definite amount of heat for a given weight. If it be mingled in certain proportions, either with atmospheric air or with pure oxygen, the mixture is highly explosive; but, if the mingling and combustion are constant and simultaneous, the result is a steady combustion, as in the oxyhydrogen blowpipe or the ordinary gas-burner. Of course, when pipes are melted off by the direct action of fire, the gas must be ignited by the fire at the instant of escape, and consequently the effect is that of a large burning jet, and not an explosion. Instances may arise, however, where pipes are ruptured by falling walls, or where lead pipes are melted off by heat communicated through walls, without the direct contact of fire or heat sufficiently intense to cause ignition, in which case the escaping gas mingles with the air, and forms a compound which explodes whenever the fire reaches it. But these cases are the effect of the spread of the conflagration, and cannot be, except under very rare conditions, a cause for it. It is, then, in the quality and quantity of gas as fuel, if at all, that it assists in the spread of conflagrations, and this, as can be easily computed, cannot by any flow possible through ordinary gas-pipes add very materially to the heat otherwise generated by the conflagration. We are compelled to look upon statements such as we find in the communication of Mr. Noyes, that "the fire in Boston was, in fact, a gas fire after the first beginning," as based upon the assertions of observers who either observed inaccurately, or who recount sensationally what they saw.

In Mr. Kidd's proposition to smother fires by the use of steam mingled with non-combustion-supporting gases, although the communication shows some research and thought upon the subject, there are insuperable difficulties. Water operates in two ways to quench fire: First, it excludes the air by forming a coating over the surface of the burning mass, which prevents contact with the atmosphere until the coating is evaporated, and it also excludes the air by the volume of steam generated. Second, by rapid evaporation, the water thrown upon fire carries off the heat from the burning material.

A fire may be temporarily *smothered out* by means of water; but, if there be heat enough remaining to evaporate the water, and above this a surplus of heat sufficient to cause combination with the oxygen of the air, combustion will be redewed so soon as the water is evaporated.

It is this last important function of *cooling by evaporation* in which the great efficiency of water as a *permanent* and *complete* extinguisher consists.

Smothering alone merely suspends combustion, which will be renewed the instant the air has access to the heated mass. Suppose, to illustrate, that it were possible to completely fill a burning building with non-combustible gas and steam so as to entirely exclude the air, and to keep it so filled for any desirable length of time, combustion would be, of course, instantly arrested. But without the application of water it would be long before the mass would be so cooled as not to commence burning again as soon as contact with air should supply the necessary oxygen. To speak figuratively, the fire giant, when once fully developed, cannot be asphyxiated. Choke him as much as we may, strangulation only suspends animation, and the instant we release his throat he springs up as vigorous. He is only dead when he is *cold*.

But, aside from the preceding considerations, what, practically, are the exhaust steam and the products of combustion of a thousand fire-engines and boilers compared with the products of combustion in the conflagration itself, and the steam generated by the water thrown upon it?

From these considerations, it seems that fire can be combated by smothering or excluding the air only at the outset, and before it reaches any great proportions. Granting the paramount importance of keeping the fire at its origin confined from the air in the room where it originates as long as possible, and admitting the undisputed utility of fire-extinguishers and like devices, we shall still have to rely upon water as Nature's great weapon to combat fire, and cooling by evaporation as the great element in its operation, not only for extinguishment, but for prevention, as we have already suggested in a former issue.—*Am. Artisan.*

Cape Breton Gas-Coals for England.

Concerning certain of these coals, called by us technically "Province Coals," a correspondent of the *London Mining Journal*, Nov. 30th, furnishes the following statement, which we copy, though being totally ignorant about the matter, we cannot indorse (nor yet deny) the statements relating to the Manhattan Company of this city:

Advices from our correspondent at Sydney, Cape Breton, inform us that mining operations are being pushed forward actively in all directions, the great difficulty being to obtain workmen, who were very scarce. At the Reserve Mines, the property of the Glasgow and Cape Breton Coal and Railway Company they have been shipping something like 400 tons of coal daily, but could raise a great deal more had the mines been fully handed. As it is, the company, although commencing late in the season, owing to the non-completion of the railway to Sydney, has shipped fully 20,000 tons, and had upwards of 20,000 tons banked ready for shipment at the close of October. Early in that month the men commenced raising coal from the slope with the permanent engine, which was sent out from the Worsley Mesnes Works, Wigan, Lancashire, and can draw 10 tons at a time. It is of 60-horse power, a single 26-inch cylinder, and 4½ feet stroke. The engine previously in use was a small 10-horse one, by Clayton and Shuttleworth, of Lincoln, and gave great satisfaction, and is now used for working a circular saw. Both slopes will shortly be working, when there will be a large increase in the out-put. For the conveyance of the coal to Sydney there are three of Fairlie's twin locomotives, and a small engine for shunting. The wharf at Sydney is 600 feet in length, the rails being 4 feet. There are capital loading berths, where ships of the largest size can take in their cargoes. When the Reserve, Lorway, Emery, and Schooner Pond pits are in full working order, and a sufficient number of men, the company expect to be able to ship 3,000 tons daily.

The coal is of excellent quality, and wherever it has been tested and used has given great satisfaction. A report from the Manhattan Gas Company of New York, states that the Reserve coal yields about 10,000 cubic feet of gas per ton of 2,240 lbs., so that it is equal to the Yorkshire. So satisfied is the gas company alluded to with the coal, that it is said they are likely to take 150,000 tons of it next season. There is a great difference in the price of coal in Cape Breton and in England. Here we deliver at 7s. per ton free on board, and some two or three cargoes are to be forwarded to England before the winter closes, so that if prices are maintained at the latest quotations sent out here there is no reason whatever why the coal of Nova Scotia should not be made available for the English market.

The Asphalte Pavement.

An effort towards the improvement of our pavements has recently been made under the direction of Commissioner Van Nort in the laying of a specimen of genuine asphalte concrete across Fifth avenue, above Twenty-fourth street, This new pavement, the "Grahamite," has been laid without expense to the city for the purpose of convincing the public that there is a vast difference between the true asphalte concretes, which have obtained such universal favor in London, and the abominations of tar and pitch which have hitherto disgusted and annoyed us in New York. It is claimed that if an asphalte pavement similar to those approved in London, will answer as a substitute for the wooden and stone pavements of this city, we shall save an enormous amount annually now expended for repairs. Half a million dollars yearly thrown away in repairing wooden pavements would keep 2,0000,000 square yards of asphalte pavement in perfect order, besides saving a large percentage of the same amount in the wear and tear of vehicles and horses. Too much money has been thrown away upon new pavements which have never been subjected to proper trials, and this action of the Commissioner will protect us against further imposture. The present appearance of the "Grahamite" on Fifth avenue and on Thiaty-eighth street, between Fifth and Madison avenues, justifies the expectation that it may satisfy all the conditions required to render it acceptable. The Belgian pavement on Fifth avenue may be lowered four inches, reset, covered with a cushion of asphalte, and finally receive a smooth surface of "Grahamite" at less than half the cost of the granite-block pavement of Broadway.— *World.*

[With regard to the above, the Editor of this Journal, can take room to say only that grahamite is *not asphalt*, but a peculiar mineral, totally differing therefrom. The introduction of this mineral as a material for paving, for gas making and many other uses was founded on inventions of his own, and he claims therefore to speak "as one having autnority and not as the Scribes."—H. Wurtz.]

The "Porter and Lane" Process.

With regard to this process, the following too vague specification of which is due to the *Engineer* of London, we have noticed elongated advertisements in the London newspapers, but as yet nothing has come to us in the way of exact accounts of methods and results, that would justify transfer to our columns:

"The 'Chartered Company' of London are now engaged in the trial of the Porter and Lane process. It has two advantages, namely, the continuous passage of the coal, through the retort, and the working of this process by steam power. The retort is vertical, and has within it a screw of peculiar form, attached to a central spindle and screw having the effect of regulating the descent of the coal in its passage, through the retort. A thin layer of coke is thus brought into contact with the *entire surface of the* retort, and the fresh coal comes in at the top, and the exhausted coke discharged below. Its commercial aspect is perhaps more hopeful than the Eveleigh process. Messrs. Porter and Lane estimate that they get 2000 feet of gas from a ton of coal in excess of the quantity obtained by their usual mode, and that the total saving is five shillings per ton of coal carbonized. One retort bench is calculated to replace five of the old method. There is, however, one drawback, and that is, the inferior character of the coke."

Furnace Heat.

The warming of houses by hot-air furnaces presents many advantages, among which are the avoidance of draughts, the better distribution of the heat throughout the halls and rooms of the building, the continual introduction of fresh air from without, and the confinement of the coal and ashes to the cellar. On the other hand, there are certain disadvantages attending the use of this method of warming which have so important a bearing on the health of the persons subjected to it that they cannot be disregarded with impunity.

Prominent among these disadvantages is the dryness of such artificially heated air. It is true that the chamber of the furnace may contain a water-pan, and this may be filled with water, but in the great majority of instances it is too small to accomplish the purpose for which it is intended. Hot dry air is consequently inhaled, and, coming in contact with the delicate membranes of the air passages, removes too large a proportion of moisture from them, and thereby produces an irritation which frequently causes diseases of the throat and lungs.

When diseases of the throat and lungs already exist, it is of the utmost importance that this deficiency of moisture should be corrected. The remedy is very simple, and may be applied in a variety of ways:

1st. By increasing the surface of the water-pan in the furnace chamber, or by adding one or more pans, placing them at a little distance from each other.

2d. By spreading a wet towel at a short distance in front of the hot air register, and dipping its lower edge into water placed in a shallow tin vessel.

3d. To throw steam into the air of the room by placing a tin vessel containing water on a small gas-stove, or at a height of six or eight inches over the lighted gas-burner.

Another and perhaps more serious difficulty is the escape of the gases of combustion from the fire-box into the air chamber. To prevent this, the utmost care should be taken at the commencement of the winter to close all seams and cracks in the iron-work with fire-cement, and remove all the soot and ashes from the radiator and pipes. Even when this has been properly done, these insidiously poisonous gases wil still find their way through the red-hot iron of the fire box. This can only be prevented by the use of a soap stone or fire-brick lining, by which the iron is kept below a dull red heat. The lining will obstruct the free passage of the heat, but the loss from this cause may be remedied by increasing the surface of the radiator in the hot-air chamber.—*Am. Artisan, from Scribner's in October.*

Improved Form of Gas Meter.—An ingenious apparatus is now employed in London for testing officially the quality of the gas furnished by companies for the public consumption. The apparatus consists, first, of a gas meter which presents two conspicuous index hands, one of which revolves in a minute, while the other makes a complete revolution during the passage through the meter of 1-12th of a cubic foot of gas. The first of these movements, being maintained by clock-work, is constant. The second, being dependent on the velocity of flow, or what is the same thing, on the rate of burning, may be varied by varying the freedom of discharge. Since 1-12th of a cubic foot of gas passes with each revolution, if the revolution occupies one minute there will pass one cubic foot in twelve minutes, or five cubic feet per hour. As the law requires that the gas shall possess an illuminating power, when burned at the rate of five cubic feet per hour, not inferior to that of fourteen sperm candles consuming each 120 grains of the combustible in the same time, this apparatus, when combined with a suitable photometer, is said to make the application of the test very easy. Before entering the meter, the gas passes through a governor, which maintains the burning pressure uniform, however variable may be the pressure in the mains.—*Exchange.*

[The above appears to be a description of the improved form of test meter by Sugg, now in use in many photometric rooms.]

THE AMERICAN

GAS-LIGHT JOURNAL

AND

Chemical Repertory,

PUBLISHED ON THE 2D AND 16TH OF EACH MONTH,

At No. 42 Pine Street, New York.

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EDITOR—PROF. HENRY WURTZ.
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☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

THURSDAY, JANUARY 2, 1873.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

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In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

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THE McILLHENNY METHOD.

In the issue of Dec. 16th information was given, such as must have been enough to satisfy all readers, as to the reality and importance of the advantages gained by this mode of operating, a mode which we can scarce call new, as it has been now in full use at the Portland Works since February, 1869, and at the Washington Works still longer. In this issue we are enabled to offer, in continuation of the subject, some facts and figures, from a source which must be regarded as decisive by the most skeptical of that "unbeleiving generation," the gas fraternity.

While at Portland, the idea occurred that if the officers of the gas company could be induced to furnish their own independent statement of the company's operations during the time since the McIlhenny method was adopted, it would be of great value, as altogether beyond suspicion of any interested bias. It will be readily understood that this was *much to ask* of any gas company; and we trust that our readers will appreciate, as we ourselves do, the very considerable obligation that they, as well as we, rest under to Mr. Daveis, the President of the Portland Gas-Light Company, for his communication, to be found in our correspondence columns to-day.

It will not be amiss to occupy the space necessary for a few comments on the remarkable statement of Mr. Daveis. This statement covers three years operations, during which, in round numbers, 12,000 tons of coal were carbonized, and the quantity of gas actually *consumed and paid for* (including the Co's own consumption) during the whole three years, averaged 4·66 cubic feet per pound, or 10,438 feet per ton of coal! We are very curious to know how many other companies, even operating on a far larger scale, could make such an exhibit? Details of this kind, however, are not often put before the public, and *these* are the more valuable on this account. Every gas manager can make his own comparisons and deductions, and act thereon as he sees fit. As has been stated by us before, Messrs. McIlhenny of the Washington Works, and Yorke of the Portland Works, will be pleased to correspond with any member of the fraternity, and furnish all further information; and it is our own most decided counsel to all who are interested in increasing the profitable returns from the retort-house, to communicate at once with one or the other of these accomplished engineers. Several gentlemen connected with the Portland Gas-Light Company expressed to the writer their positive belief that the rescue of that company from the verge of ruin, to which it was reduced, was due (in connection with its present faithful and upright bnsiness management) to the adoption of this mode of working in the retort-house.

It must not be forgotten that the large gain in volume of gas thus demonstrated, is by no means attended with a sacrifice of quality, but that there is conclusive evidence of an additional large gain in this last respect. In our former account of our own photometric experiments at Portland, it will be remembered that with an unsuitable burner, which would not burn five feet without tailing up, we obtained 17·5 candles, to which it would certainly be fair to add half a candle. Mr. Daveis now cites testimony as to its comparing favorably with the Boston gas, which every one knows is claimed (and fairly claimed, we believe) to range from 18 to 20 candles. The permanency of this gas also, is shown by the surprisingly small discrepancy between the station meter and the measured consumption. We have not at hand just now the actual average figures from the station meter for the three years, but if we take the average yield observed during the two days of our own observations, namely 4·89 feet per lb., the whole loss, from both condensation and leakage, would be 0·23 foot, or less than 5 per cent. This figure will serve also as matter of comparison for managers of other works.

We have a few other figures to present which are of interest in connection with this invention, but which must go over for the present. When in Portland, the Engineer's Journal was kindly submitted to our inspection, and at our solicitation a transcript was furnished of some of the tabulations therein. These, or a part of them at least, will appear in the neqt issue.

THE REIGN OF FIRE.

We shall not go over the dismal recent list of losses and of horrors. Our space would scarce be adequate even for a catalogue. How many are yet to come in the near future we shall know when they have come; but no reason is there why they should not continue to come in equal measure. Nor should the writer have the heart to reiterate what really seems a work of supererogation, namely his own ideas of what ought in reason to be used as safe material for human dwellings and vehicles—in the face of the discouraging neglect with which his former efforts in this direction have been treated—were it not for some recent symptoms in influential quarters of a "coming round" to these same views. Thus lately the *American Artisan* put forth the proposition that buildings should be made up of "iron-inclosed water spaces." This suggestion has been widely copied and with high approval. Now, as has been before pointed out by the writer, his own plan of employing exclusively for these purposes wood that has been impregnated throughout with water, this water being held in permanent combination with certain cheap saline substances, so that it will never dry out, is the perfection, and in reality the only practical realization possible, of this idea.

Another encouraging fact is that the distinguished English scientist, Prof. Pepper, lecturing here lately on "Fire and its Prevention," summed up by recommending "preserving the timber and making it incombustible by chemical preparations."

When it is considered that the writer's methods likewise *preserve* the wood, season it *perfectly*, so that it never changes in volume, render it *tougher* and more elastic, make it a *non-conductor of heat*, so that both houses and rail-cars built of it will be more comfortable both in summer and winter, and impart other advantages, heretofore set forth in these columns—he is really at a loss to understand why, when vagaries, even of a chimerical sort, have been and are being solemnly discussed, *usque ad nauseam*, his own particular vagary, which he has urged upon the community now for at least a decade, should be disdainfully and totally ignored by all the technical journals. It is at least founded on chemical science, and it may be added, on painful and costly experiment.

THE LONDON GAS-STOKERS' STRIKE.

In another column we cite from a London contemporary the earlier history of this momentous event. We have further items on the subject that may find room hereafter.

In the mean time, the result has been of a character such as to disarm, if not to convert in-

to some sort of compassion, the indignation naturally felt by the gas fraternity at such a conspiracy on the part of those pernicious Trades-Unions. They did not foresee that elements enter into the question of gas-supply that must take it in important respects out of the pale of ordinary manufacturing operations. The sequel of the story is told by a newspaper correspondent, under date of Dec. 9th, as follows:

"The backbone of the gas-stokers' strike is broken, and although in a few quarters the supply of gas is insufficient, in all the rest of the metropolis it is abundant. The 4,000 stokers are now contemplating the doleful prospect of a winter without work. None of the companies will receive any of the strikers into employment again, and the result will be the collapse of the union which proudly boasted that it could 'put London in darkness in six hours.'"

APOLOGIES.

We owe to the communicants of a number of interesting and important documents that we should crave their patience, our spirit being willing but our capacity much too limited. Among these we will specify:

Report of the Water Commissioners of the city of Rochester, from Professor Lattimore.

Treatises on Alizarine and Aniline Black, by Professor Versmann.

Second and Third Annual Reports of the Gas Inspector of Pittsburgh, with a communication thereon.

A circular of the Rumford Chemical Works.

A communication from Robert Hogarth Patterson, Esq., of the late Board of Gas Referees of the city of London, with a copy of a patent issued by him for Gas Purification, from which patent we propose, when practicable, to make extended extracts, with comments.

Etc., etc., etc.

SPECIAL NOTICE.—The attention of gas men and others interested in the manufacture of illuminating gas, is directed to the advertisement on this page, headed "Gas Works for sale." Parties desirous of investing will find this a favorable opportunity, as liberal inducements are offered.

GAS WORKS FOR SALE.

THE SUBSCRIBER OFFERS FOR SALE THE GAS WORKS situated in the town of Dover, Delaware. These Works were purchased in the year 1866, at one half less than their original cost, being allowed to run down at that time. Since our purchasing them the consumption has increased 300 per cent. We would prefer to sell to a practical Gas Fitter and Plumber, and will make the terms liberal. The Works are now in perfect running order, and will pay $2000 per annum. We offer these Works for $7000. Our object in selling them is that we have more business than we can attend to. We being large consumers ourselves, we purchased them to furnish our own factory with gas. For further particulars address

RICHARDSON & ROBBINS,
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E. FOSTER & Co. have for sale Fifty thousand tons of Gas Cannel for delivery over next year. Analysis, 10,000 cubic feet of gas per ton. Illuminating power 22 candles. Coke 12 cwt.

Coals of all descriptions shipped from any port.

TO GAS COMPANIES.

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A NEW INVENTION FOR LIGHTING STREETS.

Gas Engineers,
Gas Companies,
Officers Having Charge of Lighting the City,
Scientific Men,

and those who pay taxes for lighting our highways, are invited to examine a new invention, patented by M. B. DYOTT, which has the following points of excellence and superiority over all other means of street illumination. It doubles the power and efficiency of the gas used in it. One lantern with a 5 or 6 foot burner is superior to *four single top* lanterns, in which 3 or 3½ foot burners can only be used with safety (a larger burner will so heat the glass that rain will break it). It is an established fact, that one 5 foot burner will give more light than three that consume 3 feet each, or 9 feet of gas.

DYOTT'S patent **Luminous Reflecting Street Lamp** has a beautiful semi-transparent opaline PROTECTOR and REFLECTOR, which never loses its brilliancy, throws a softened light upon the upper portion of the buildings, and reflects the light, which is in all other lanterns wasted in lighting the sky, beneath, around, and where it is wanted. The top of our "CHAMPION LANTERN" being *double* the intervening air space, keeps the opaline dome cool, no matter what heat and light may be put in it, and cannot be broken by inclemency of the weather. Upon this semi-transparent dome is displayed the names of streets so distinctly, that they can be read at a great distance. The globe is egg-shaped—the strongest of formations. The lantern is so constructed, that three of them can be cleaned in the time required to clean one of the old style. They are made of copper, brass, and iron, and are ten times more durable than those now in use. Being the most durable and efficient, they are the most *economical*, and being the most beautiful, are an ornament to the city.

We are prepared to furnish these lamps, or to negotiate with Cities or Corporations, for the right to make and use them, and will be pleased to furnish any information, and illustrated circulars, upon application personally or by letter to

M. B. DYOTT,
114 South Second Street,
Philadelphia, Pa.

Those who desire to participate in forming a Company to manufacture and handle this invention, or to purchase rights, will address as above. 312

FOR SALE.

An Exhauster.

made by R. LAIDLAW & SON, Glasgow, to pass **150,000** cubic feet per hour. Apply to

W. W. GREENOUGH,
311-4t Treasurer Boston Gas-Light Co.

To Gas Companies.

AN AMERICAN ENGINEER,

who has for many years made Gas a specialty, during which time he has built and managed a number of Works, and is now running one designed and built by himself, desires to change, for reasons which will be given at interview.

Unexceptional refetence furnished as to ability and business qualifications.

☞ Would run a Works by contract or lease.

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Stacks and Benches Built,

AND

CLAY AND IRON RETORTS SET,

FOR GAS WORKS, BY

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310-3m 2148 North Second Street, Phil'a., Pa.

GEO. A. McILHENNY'S

PATENT

VACUUM PROCESS,

FOR RELIEVING GAS RETORTS FROM PRESSURE.

Patented in the United States and Great Britain, June 1867 first patent for this purpose in the United States (but not presented to the public until fully tested). Now in successful operation for six years, with most satisfactory results.

The many devices lately brought to the notice of the American public, to accomplish the same results are mostly old English contrivances tried and abandoned years ago, on account of the machinery, stuffing boxes, valves, levers, etc., necessary

But the extraordinary results obtained by the McIlhenny process, have induced some unprincipled persons to bring to the notice of the public, as *recent inventions of their own*, some of these old devices; their purpose seems to be simply to evade the patent.

This process is not only safe, simple and effective, but costs little to apply. The only machinery necessary is a one and a half inch stop cock, and a half inch stop cock to each bench No alteration in the old system is required. In fact, a Works operated with this process, can at any time be operated on the old pressure system, simply by closing the two stop cocks above mentioned. There is nothing to get out of order, nothing that requires special attention; no stuffing-boxes to pack and keep tight, no valves to keep clear of tar and pitch, no levers to lubricate, and no expense for a great amount of machinery.

The McIlhenny process challenges the world as regards yield and quality of gas.

For particulars apply to GEO. A. McILHENNY, Engineer of the Washington Gas-Light Co., Washington, D. C., or to WILLIAM YORKE, Engineer of the Portland Gas-Light Co., Portland, Me., who will take pleasure in corresponding with any one interested. 307-1y

RETORTS AND PIPES FOR SALE.

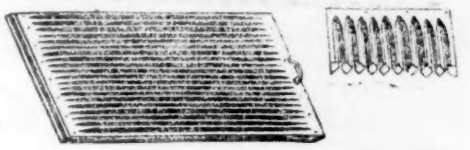
Three new Iron Retorts, never used. Mouth-pieces, Stand Pipes and Bridge Pipes complete (Sixes) for three Benches o Retorts (Three's). Have remodeled the Works and got in new patterns. Will be sold at half the price of new ones.

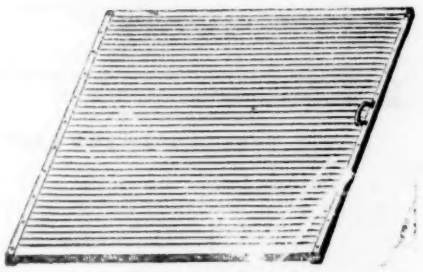
Address W. H. DENNISTON,
307-unl Sup't East End Gas Co., Pittsburgh, Pa.

J. L. Cheesman,

MANUFACTURER OF

Patent Conically and Diamond Slotted Solid Wood Trays.





To Gas Companies.

The above Trays will last longer, and are cheaper than any Tray now used. They are now made without any outside strips, which gives more purifying surface, being perfectly smooth. The lime will not adhere to them as in other Trays. They are now used in over three hundred Gas Companies in the United States, and other places.

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MANUFACTURERS OF

GLYCERINE for GAS METERS,

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☞ We are now prepared to furnish Glycerine to Gas Companies, etc., for filling Meters.

☞ Orders promptly executed. 306-3m

LIGNITES.—In the tremendous efforts which all nations are now making to throw off the British commercial yoke, at a time when the English are so much embarassed in their industries, many facts are brought out which can teach us the value of some of our own products. The Italians are trying to give more extended use to their lignites. That of Monte Rufoli burns well in fire-places, without making any noise, and experiments have been made which have proved it not very inferior to the most expensive Newcastle coal, one quintal of the former being equal to three quarters of a quintal of the English coal. This material is already used in distilleries, and it is likely to be employed in the fusion of the iron of Elba, as it contains no element injurious to that mineral. If the latter test succeeds, our Western metallurgists may take comfort, for their coal is excellent *for lignite*, and will do what any other variety of that fuel can accomplish.—*Eng. and Min'g Jour.*

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

JANUARY 2, 1873.

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English Cannel.			
Ince Hall	$13 50	@	14 00
Kirkless Hall	13 00	@	13 50
English Caking Coals.			
Newcastle Gas	$7 50	@	8 00
Liverpool caking	7 25	@	7 50
British Province Coals.			
International—At Mines, $2 00 in currency	—		—
Block House—At Mines, $1 50, Gold			6 25
Little Glace Bay—At Mines, 1 60 Gold	—		—
Pennsylvania Coals.			
Penn Gas Coal—At Amboy	$6 75	@	0 00
Westmoreland	6 75	@	0 10
Shafton	6 00	@	0 00
Youghiogheny—At Baltimore	5 50	@	0 00
West Virginia Coals.			
MurphyRun	$6 75	@	0 00
Despard	6 75	@	0 00
West Fairmont	6 87½	@	7 00
American Gas Coal	6 62½	@	6 75
Fairmont	6 75	@	0 00
Newburgh Orrel	6 75	@	0 00
Pinnickinick	6 75	@	0 00
Cloverhill of Virginia	5 25	@	5 50
McKenzie Compound Mixture			8 00
American Cannel Coals.			
Peytona of West Virginia	$14 00	@	14 50
Darlington of Pennsylvania	—		—
American Cannel	$10 00	@	10 00
Asphalts.			
Albertite of New Brunswick	$18 00	@	18 00
Ritchie Mineral of West Virginia	17 10	@	00 00
Trinidad Bitumen	—	@	14 05

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GAS BURNERS, APPARATUS, ETC.

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Cast Iron Gas and Water Pipes—R. D. Wood & Co., Philadelphia Pa 3
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GAS COALS.

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Grahamite or Ritchie Mineral—27 South Charles street, Baltimore, Md. 8
Ohio Gas Cannel—George Merryweather, 5½ Pine street, New York 3
The Newburg Orrel Coal Company—Chas. W. Hays, Agent in New York, Trinidad Building, 111 B'way, Room 7 5

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Cast-Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md 6
Continental Works—T. F. Rowland, Greenpoint 5
Camden Iron Works, Camden, N. J.—Jesse W. Starr & Sons 7
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School of Mines, Columbia College, East 49th st 5
Scientific and Chemical Expert—Prof. H. Wurtz, 26 Pine street, room 36, N. Y 7
Screening Shovels—O. R. Butler, 126 Maiden Lane, N. J 4
Works upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y 9

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Your attention is respectfully called to the GAS SCREEN now being manufactured by the American Gas Screen Manufacturing Company, under the patents granted to E. DUFFEE, and are pleased to submit the following points of their excellence and superiority over all other screens now in use.

The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces. the edges of the frame being grooved to prevent abrasion.

The advantages of the screen are:

1st. The large purifying surface, the construction of the Screen giving over three-fourths of the surface for the gas to penetrate the lime.

2d. On account of the free passage of the gas through the Screen the pressure is reduced, thereby preventing the accumulating of carbon on the retorts.

3d. The saving of lime and labor, as the Screens are not liable to clog, and are easily cleaned.

4te Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any other now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

LUTHER DAY, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why they will not last for a long time. The *very large amount of open space* in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great and were gauges used more frequently than they now are in many gas-works, this facat of having *open Trays* would become more apparent to mangers of gas works. The digerence in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified. per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yours,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years, and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respectfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen: We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3. 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months, and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870.

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.
SPRINGFIELD, MASS., Oct. 10, 1871.

Mr. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them being able to purify over fifty pet cent. more gas with them, than with any other Screen we have used.

Yours respectfully,
THOMAS J. PISHOU.

OFFICE DETROIT GAS-LIGHT CO.,
DETROIT, MICH., April 22, 1872.

AMERICAN GAS SCREEN MANUFACTURING CO., HAVERHILL.

Gentlemen: The Screens bought of you work far better than any we have ever used. As a proof, we have with the same quantity of lime purified *twenty per cent.* more gas with your Screens than with any others, and the work well done. The workmen are also better pleased with them—they being light and handy to work. They also relieve the pressure very much upon the retorts, and I cheerfully give you my experience.

Yours truly,
P. E. DEMILL. Secretary.

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Address **A. P. JAQUES, Treas.,**
Amer. Gas Screen Man'f'g Co., Haverhill, Mass

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CHARLES MOWTON, Engineer New York Gas-Light Company, N. Y.
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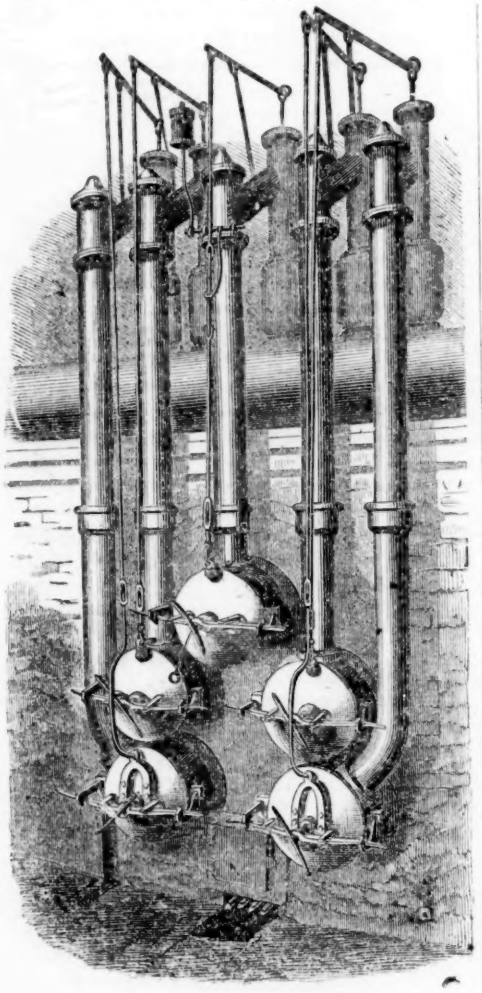

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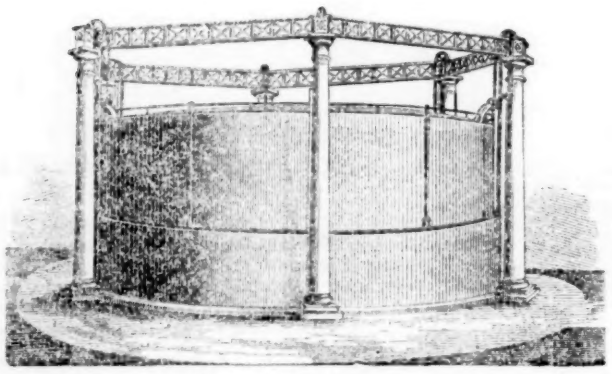

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E. W. McGINNIS, Secretary and Treasurer.
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LEONARD D. GALE, Consulting Chemist.

GENTLEMEN: We beg leave to inform you, that we have purchased the Patent process for making ILLUMINATING GAS from PETROLEUM and its products, known as the

Gale and Rand Patents,

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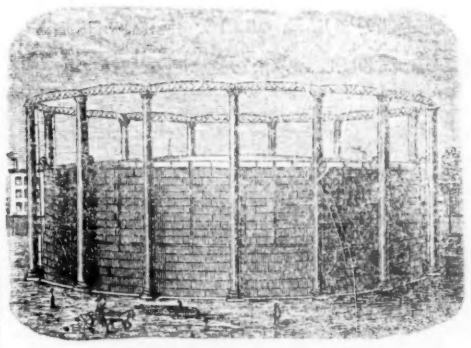

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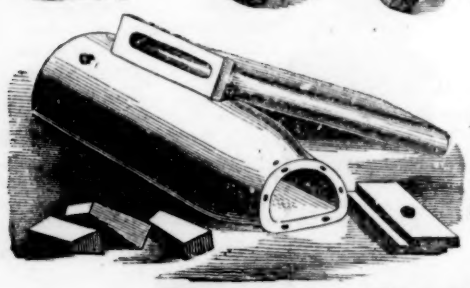

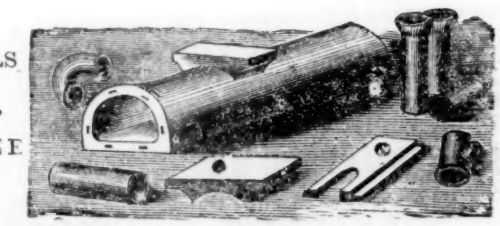

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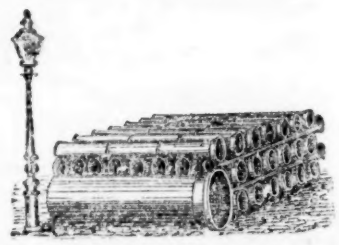

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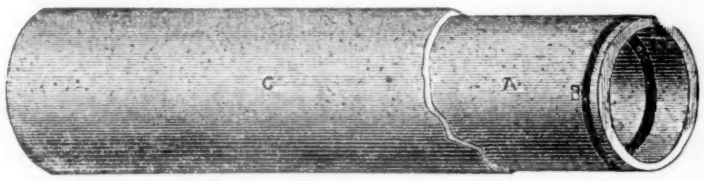

FIG. 2.

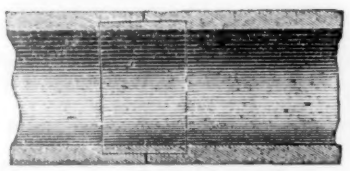

FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

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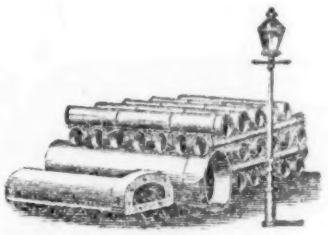

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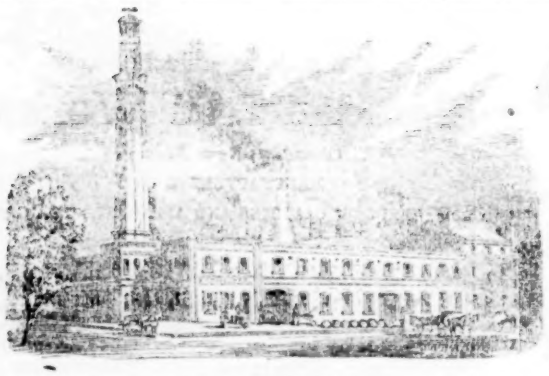

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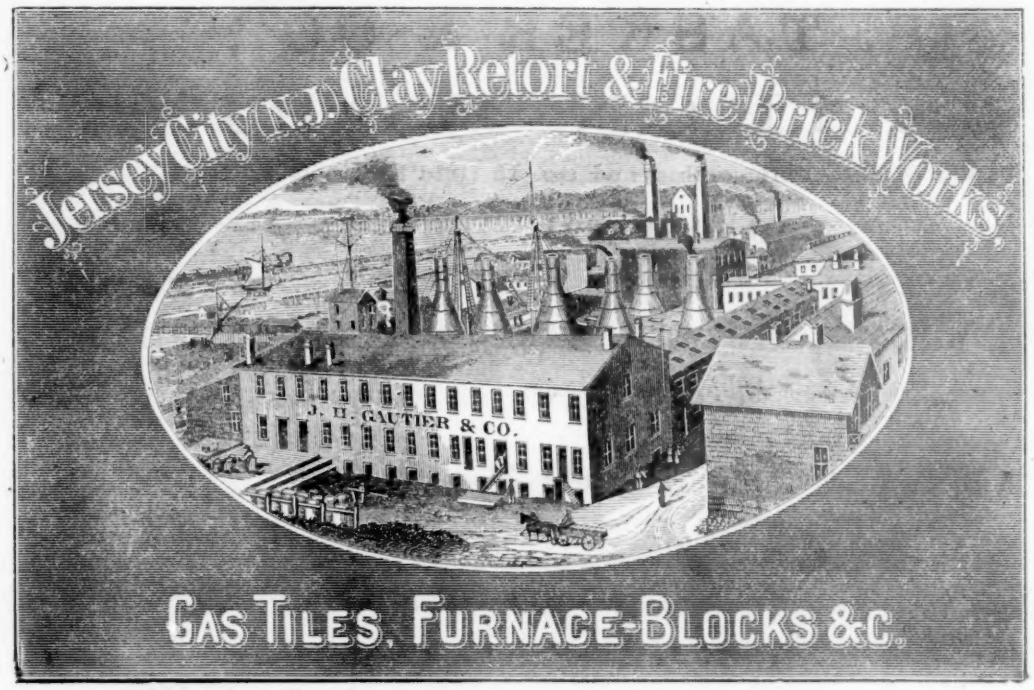

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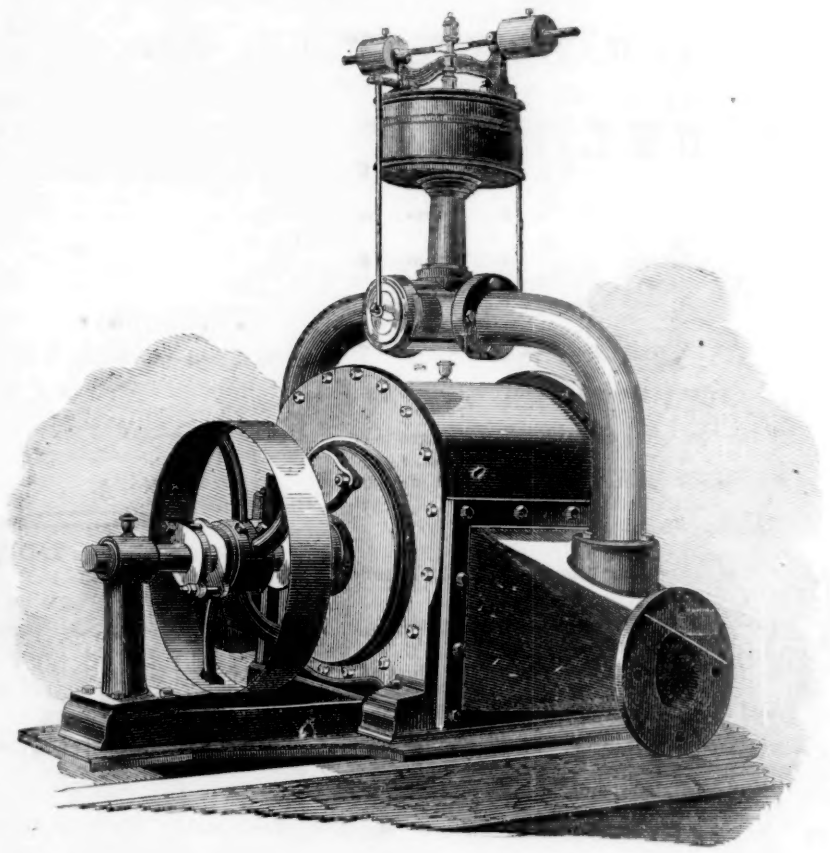

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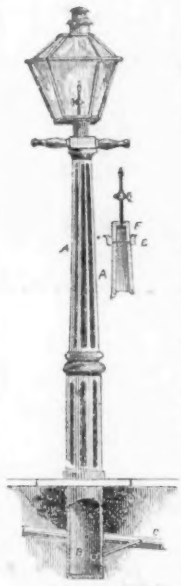

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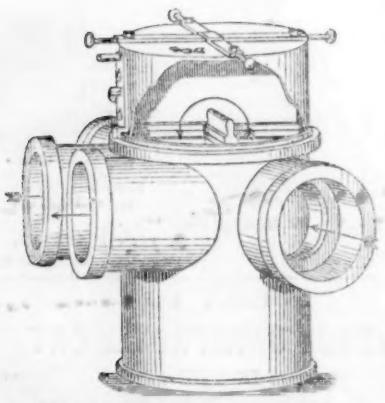

By Pass with Drip for Single Apparatus.

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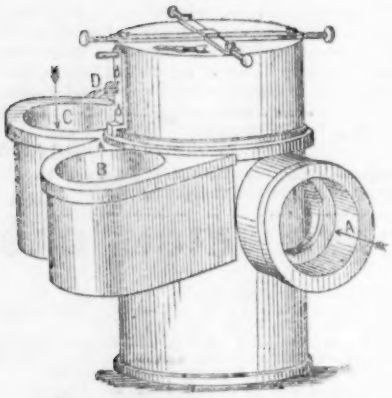

Meter By Pass with Drip.

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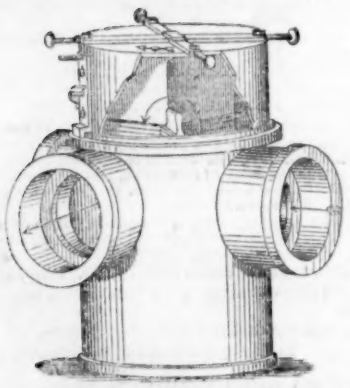

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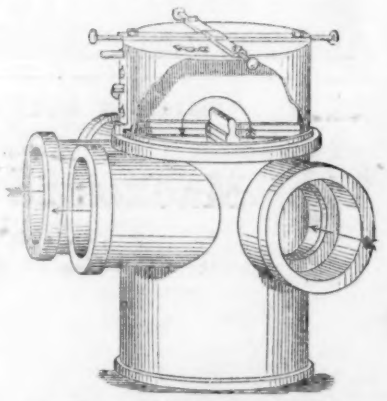
No. 2 is a By-Pass for using two apparatus, the gas is entered and the direction of its current is controlled similarly to that of No. 1, just described.

No. 3 is a By-Pass for passing the gas around the meter or not, according to the set of the loose or circular valve.

No. 4 is a sectional view of No. 3, and fully illustrates the construction and arrangement of the various By-Passes; the vertical partitions P are placed at right angles and divide the By-Pass into four drip chambers, they extend to within a short distance of the bottom to allow the water W, which forms the water seal, to circulate freely; the valve V is constructed with a diaphragm which divides it diametrically, the edges from ground joints with the upper edges of the partitions P, to prevent the gas from leaking from one chamber to another, and also to protect the ground surfaces from the corrosive action of the gas.

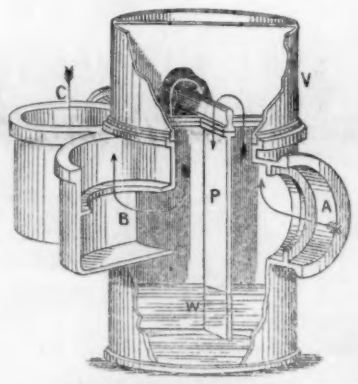
No. 5 is a single By-Pass with Drip Chambers.

No. 2.



By Pass with Drips for two Apparatus.

No. 4.



Section of No. 3.